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THE SOCIO-SPATIAL DEVELOPMENT OF JAFFA–TEL AVIV:

The emergence and fade-away of ethnic divisions and distinctions

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ABSTRACT

This paper examines how a cognitive boundary with no physical presence has affected life in the cities of Jaffa and Tel Aviv, not only during its time of existence (1921-1950) but many decades after it was erased from all official documents. In 1921, the national aspirations of Jews in Jaffa, embraced by the local British Mandate government, triggered a segregation process that resulted in an official administrative split of Jaffa's urban area and the creation of the "Hebrew" city of Tel Aviv on Jaffa's northern parts. This administrative division had a clear ethnic character, dividing the entire urban fabric into a clearly defined "Jewish" and "Arab" geographical entities and influencing the development of the two municipalities as well as the daily life of their populations. After the 1948 War in Palestine, which led to the flight of almost all of Jaffa's Arab population and the annexation its area to Tel Aviv, the united city continued to resemble a split city, with the former areas of Jaffa remaining relatively underdeveloped and neglected for decades.

By combining spatial analysis and historical research, this study reveals how the "paper boundary" that was drawn between Jaffa and Tel Aviv in 1921 transformed the life of Arabs and Jews in the two cities in a way that undermined the physical unity of the urban fabric and the spatial potential of its street network. The creation of the municipal border led to the cognitive marginalization of the spatially central Manshiya neighbourhood, and later to its deterioration and eventual destruction. Ironically, the destruction of Manshiya gave a belated physical expression to the historic cognitive separation between the centres of Jaffa and Tel Aviv, working against the wish to unite the two cities into a single urban entity after 1948.

KEYWORDS

Space syntax, ethnic conflicts, spatial potential, cognitive borders, shifting centralities, history of divided cities

1. INTRODUCTION

Space syntax analysis methods have long been applied in studies on divided cities where division lines were physically manifested while preventing or controlling movement between hostile urban territories. Examples from past studies, such as Berlin before and after reunification (Desyllas 2000), Belfast with its peace walls between Catholics and Protestants (More 2010), and Beirut's division lines of the civil war years (Karimi 2013) show that physical divisions within an urban network affect the social and economic life of cities, as well as their centre-periphery relations. Much less attention, however, has been given to intra-urban "paper boundaries", which can be defined as non-physical borders whose existence is exclusively dependent on graphical and textual representations that are external to the actual territory. Despite having no tangible physical presence in the city, they do have a hold on the spatial perception of the urban space, and therefore, given the right conditions (like fierce ethnic conflicts), can potentially have a similar effect on city life as physical borders have.

This paper examines how the urban transformation of Jaffa and Tel Aviv, two cities that constitute a single urban entity, has been heavily influenced by the ongoing conflict between Arabs and Jews in British Palestine and especially by the 1921 decision to officially separate Tel Aviv from Jaffa. The division of Jaffa into two separate municipalities sharing a single, interconnected urban network (Figure 1 and Figure 2) created an uncommon situation. Jaffa-Tel Aviv could not be regarded a "divided city" in the common, conventional sense of a city divided by a physical border (e.g. Berlin during the Cold War, Jerusalem between 1948 and 1967). Nevertheless, the urban area shared by the two cities was perceived by their populations as holding a clear geographical definition of separate Arab and Jewish entities, with interconnections between the two unwanted and unwelcome. While Jaffa officially ceased to exist following the 1948 Arab-Israeli War, the flight of its Arab population, and the annexation of its area to Tel Aviv, this cognitive distinction between the former two cities affects the way Tel Aviv's urban fabric is perceived, planned, and used even today.

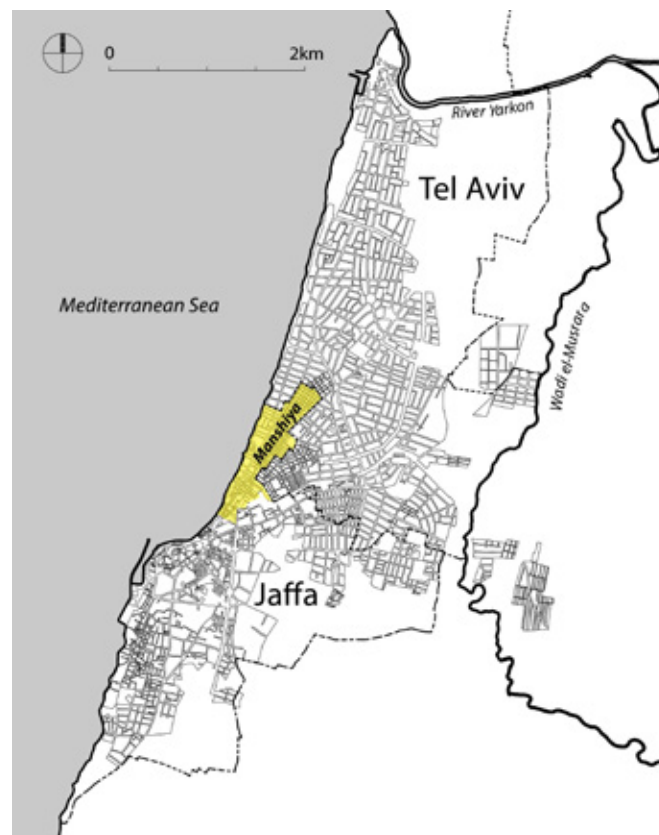


Figure 1 - Jaffa and Tel Aviv in 1948, showing the "paper boundary" between the cities and the location of the central Manshiya Quarter



Figure 2 - Map showing central urban locations in pre-1948 Jaffa and Tel Aviv

2. SPACE SYNTAX AND HISTORICAL RESEARCH

Space syntax' underlying assumption is that the spatial organization and spatial configuration of an urban street network affect the ways people perceive space or use it (Penn 2003, Hillier and Iida 2005, Karimi 2012), and therefore shape movement patterns within it (Hillier 2012). Such relations have been confirmed in numerous case studies that used space syntax analysis, demonstrating also the predictive capacities of the methodology for planning purposes. Yet this "predictive" capacity could be also exploited for describing (or "postdicting") certain social aspects of past built environments based on their syntactic spatial properties. For example, in several research projects on excavated towns, results of space syntax analysis conformed to the reconstruction of urban life as reflected by the physical artefacts found during excavations (Craane 2009, Stöger 2011, Van Nes 2011). A similar rationale can be applied to the study of a city's history, through the coupling of spatial analysis and archival evidence.

In our study, we followed the conceptual path suggested by Griffiths (2012), who called for the integration of space syntax analysis into historical research for supporting explanations of social phenomena organized in time and space. According to Griffiths, this relatively rare approach, which has been applied only in a handful of studies (Zhu 2004, Vaughan and Penn 2006, Griffiths 2008, Craane 2009, Griffiths 2009, Griffiths 2011, Griffiths 2012, Griffiths 2013, Griffiths et al. 2013), "provides a way into conceptualizing and thinking about the role of 'space' and its relation to life in the built environment that does not rely uncritically on powerful images imported from well-established historical discourses" (Griffiths 2012, 9) and therefore can "improve historians' understanding of how changes in the shape of habitable space affected people's lives and urban culture in particular times and places" (Griffiths 2012, 17).

When dealing with historical research, we should not interpret space syntax analysis results as describing solid and "objective" reality of a city, since the spatial significance of certain locations may depend on other factors than their pure spatial configuration. What we may learn from the juxtaposition of spatial analysis and historical narratives is to what extent the spatial configuration of a city affected the way it was used. In other words, space syntax analysis can be regarded as producing only a description of the "spatial potential" of an urban area; whether this potential was realized or not depends on complementary historical evidence that should be considered. The historical case of Jaffa and Tel Aviv, with its underlying ethnic conflict that controlled the use of urban space, clearly demonstrates this point.

3. CASE STUDY: A CONCISE SPATIAL HISTORY OF JAFFA-TEL AVIV

Jaffa is a historic port city to the shores of the Mediterranean Sea, with a recorded history of about four millennia. In the beginning of the 1870s, it was still a relatively small walled town of about 5,000 inhabitants that served as the main harbour of Palestine, by then under the rule of the Ottoman Empire. A single gate in its walls connected the town's biggest bazaar and mosque to the main roads leading to the cities of Jerusalem, Nablus, and Gaza. The town was surrounded by a large hinterland of citrus groves.

During the 1870s the town walls were partially dismantled and some new commercial and residential buildings were constructed along the main roads extending from the town's historic centre. About a decade later, rapid urban expansion to the north of the old town, an area of sand dunes, created Jaffa's new commercial and residential centre. This development was carried out in a sporadic nature, driven by private initiatives of varied types. It was expedited by increasing Jewish immigration to Palestine, which created an exceptional demand for housing in Jaffa. Although Jaffa's expansion was not restricted to the north of the old town, the emerging northern quarter was far more urbanized in nature than the main development on Jaffa's southern part. This difference in character between the northern and the southern extensions of Jaffa was enhanced following the opening of Jaffa's first train station in the northern part of the city in 1892 (Kark 1990). Jaffa's main northern quarter was ethnically mixed (i.e., populated by Arabs, mainly Muslims, and Jews) (Great Britain Colonial Office, 1921: 18), and was commonly known by the name "Manshiya", though its Jewish residents referred to it by a Hebrew name, "Neve Shalom" (Aleksandrowicz 2013).

3.1 THE FOUNDING OF TEL AVIV

The first organized settlement in the northern part of Jaffa (Neve Tzedeq neighbourhood, 1887), was built by a private Jewish association for housing. Similar schemes that followed during the 1890s and 1900s resulted in the establishment of a few other small neighbourhoods, including the Jewish neighbourhood of Tel Aviv, founded in 1909. Unlike its predecessors, Tel Aviv's foundation was strongly related to what can be described as the "Hebrew cultural project" and its realization in Palestine, especially in the creation of new, "Hebrew" forms of settlement in which the physical environment would support the metaphysical transformation of the Jewish people into an autonomous modern nation (Even-Zohar 1990, Chowars 2002). Thus, Tel Aviv was conceived and developed as a "Hebrew city", the first of its kind worldwide (Druyanov 1936, Weiss 1957, Katz 1984), and this concept affected the daily life in the neighbourhood and some of its spatial and architectural characteristics (Helman 2002, Harpaz 2013)

Under the rule of the Ottomans, who were openly hostile to the Zionist movement, Tel Aviv's ambitions to become fully independent from Jaffa could not be realized. New opportunities followed the British occupation of Palestine in late 1917. In July 1920, a High Commissioner for Palestine, the Jewish Herbert Samuel, was appointed as the head of the country's local civil government. Less than three weeks after Samuel took office, the leaders of Tel Aviv approached him in person, petitioning for a partial independence from Jaffa municipality. The British administration favoured the idea, Jaffa municipality did not oppose it, and an official ordinance that granted Tel Aviv the legal status of a "township" came into effect on 1 June 1921 (Shavit and Biger 2001, 159-63). The newly drawn border between Jaffa and Tel Aviv was shaped according to the "Hebrew city" concept: Tel Aviv's territory included parts of the older Jewish neighbourhoods of northern Jaffa, while leaving out ethnically-mixed areas like that of Manshiya/Neve Shalom.

The new municipal border, dividing an existing urban fabric, had no roots in the self-organization of the urban activities, nor had it any conspicuous physical elements to be attached to or existing cognitive divisions to follow. Moreover, as with many urban boundaries, the new border lacked physical manifestations, making it impossible to discern where Jaffa ends and where Tel Aviv begins. Nevertheless, as a cultural tool for shaping a common cognitive division of urban space, the new boundary proved to be more than effective.

3.2 THE SOCIAL DIVISION OF URBAN SPACE

The immediate effect of the new status of Tel Aviv on Jaffa's urban development was the division of planning powers between the Jaffa municipality and the new township of Tel Aviv. In 1925 Patrick Geddes was invited to produce the first masterplan for the Tel Aviv, which was by then nothing more than a random agglomerate of small neighbourhoods (Geddes 1925). This act reinforced the cultural distinction between Jaffa and Tel Aviv, at least in the eyes of the Jewish population. Tel Aviv was constantly trying to differentiate itself from Jaffa as much as possible, both by emphasizing its Hebrew character (which contrasted the "Arab" nature of Jaffa) and by claiming a modern character for its built form, allegedly contrasting the "traditional" and "oriental" character of its mother-city. Geddes' plan assisted in creating a distinct spatial order which should have shifted Tel Aviv's centre of gravity up north, as far as possible away from Jaffa's Old Town and even from the older parts of northern Jaffa, i.e. from the former commercial hub of Manshiya/Neve Shalom.

During the 1920s ethnic tensions between Arabs and Jews in Palestine escalated, culminating in a wave of murderous attacks on Jews in August 1929, mainly in the old Jewish communities of Jerusalem, Hebron, and Safed. As a result, the division of urban space according to ethnic definitions became more acceptable both in Jaffa and in Tel Aviv. The parts of northern Jaffa that were now under the powers of Tel Aviv were regarded a "Jewish" territory, while the territories on the Jaffa side of the border were perceived as purely "Arab". The "paper boundary" between Jaffa and Tel Aviv created a new reality, in which the northern commercial centre of Jaffa until 1921 (Manshiya/Neve Shalom) was transformed into a "final frontier". Its growing marginality (despite its central location) now led the public in Jaffa and Tel Aviv alike to perceive it as nothing

more than a slum trapped between the two cities (Hatuka and Kallus 2006, Aleksandrowicz 2017). During the 1940s Jaffa Municipality even promoted two masterplans for the total “reconstruction” (which effectively meant demolition and rebuilding) of the neighbourhood, reflecting its eroded reputation (Aleksandrowicz 2017).

3.3 THE 1948 WAR AND ITS SPATIAL CONSEQUENCES

The 1948 Arab-Israeli War in Palestine resulted in the flight of almost all the Arab population of Jaffa. The city was merged into Tel Aviv’s municipal area, effectively creating a new, united municipality named “Tel Aviv-Yafo” in April 1950 (“Yafo” is the biblical Hebrew name of Jaffa). From the 70,000 Arab residents living in Jaffa before the war, about 3,000 remained in the united city, becoming a negligible minority in a city of more than 250,000 inhabitants (Figure 3). Even before the new municipality was formed, Israel Rokach, the powerful mayor of Tel Aviv, initiated extensive demolition operations in Manshiya and Old Jaffa, as a first step of a massive “urban reconstruction” plan for southern Tel Aviv (Aleksandrowicz 2017). The original plan was not fully realized, and Manshiya and the Old Town of Jaffa remained half-demolished and half-occupied until the late 1960s.

During the 1950s Tel Aviv witnessed a rapid demographic and urban growth, culminating in a city population of 386,000 in 1961. The city’s municipal boundaries were expanded to include 4242 hectares in 1951 (Shavit et al. 2007, 26), and it became a de-facto urban centre for three smaller towns to its east (Ramat Gan, Givaatayim, and Bnei Brak). The demographic effect of the 1948 War made the ethnic tensions between Jaffa and Tel Aviv a matter of the past. The small Arab population that remained in Jaffa was relocated to its southern areas (Ajami neighbourhood), while new Jewish immigrants were entering the now confiscated Arab properties in the other parts of the city. Yet the spatial distinction between the northern and southern parts of the “united” city did not disappear and retained a new character: instead of the ethno-national distinction between Arabs and Jews, the distinction was now based on the socioeconomic differences between the well-established population of Tel Aviv’s northern neighbourhoods and the weakened populations of its southern neighbourhoods, including Jaffa (Marom 2014). These areas were regarded as slums and were subject to massive “reconstruction” schemes.

The central location of Manshiya and its negative reputation made it an almost ideal candidate for large-scale urban reconstruction project. In 1959, Tel Aviv’s mayor Mordechai Namir began promoting the creation of a new central business district (CBD) in Manshiya. An international competition was announced in 1962, and a preliminary masterplan was conceived in 1965. Demolition of Manshiya’s buildings resumed during the late 1960s and continued until the early 1980s, erasing almost all its pre-1948 urban fabric and extending over about 40 hectares. Nevertheless, because of lack of proper funding for large-scale construction project, most of Manshiya’s territory remained unbuilt except a relatively small complex of office buildings; the previously dense urban fabric was transformed into an accidental mixture of main roads, parking lots, and public gardens.

While Manshiya’s reconstruction was never realized, other parts of Jaffa went into a process of limited gentrification, which began with the mid-1960s project of the “artists quarter” in the remains of Jaffa’s Old Town and continued with a gradual process of reconstruction in parts of the southern Ajami quarter since the 1980s. At the same time, Jaffa retained its old position of “otherness” in respect to Tel Aviv and is still perceived today as a “mixed” and “oriental” city, in spite of being officially an integral part of Tel Aviv (Monterescu 2009). This can be attributed to the concentration of its Arab community (of less than 20,000 in a city of 430,000 inhabitants) in several small neighbourhoods in Jaffa’s southern part. This spatial distinction between north and south persists, percolating to the towns south of Jaffa (Bat Yam and Holon). It is mostly evident in the socioeconomic differences, that still have a clear spatial component: poorer populations of Tel Aviv’s metro area tend to live in the former areas of Jaffa and the towns to its south (Figure 4).

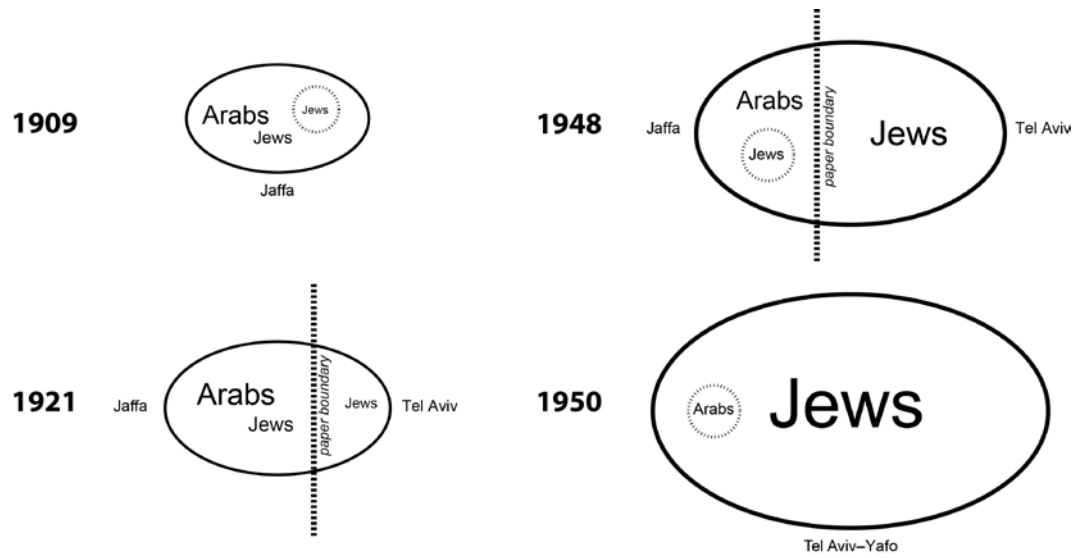


Figure 3 - A schematic illustration of the demographic and spatial transformation of Jaffa and Tel Aviv

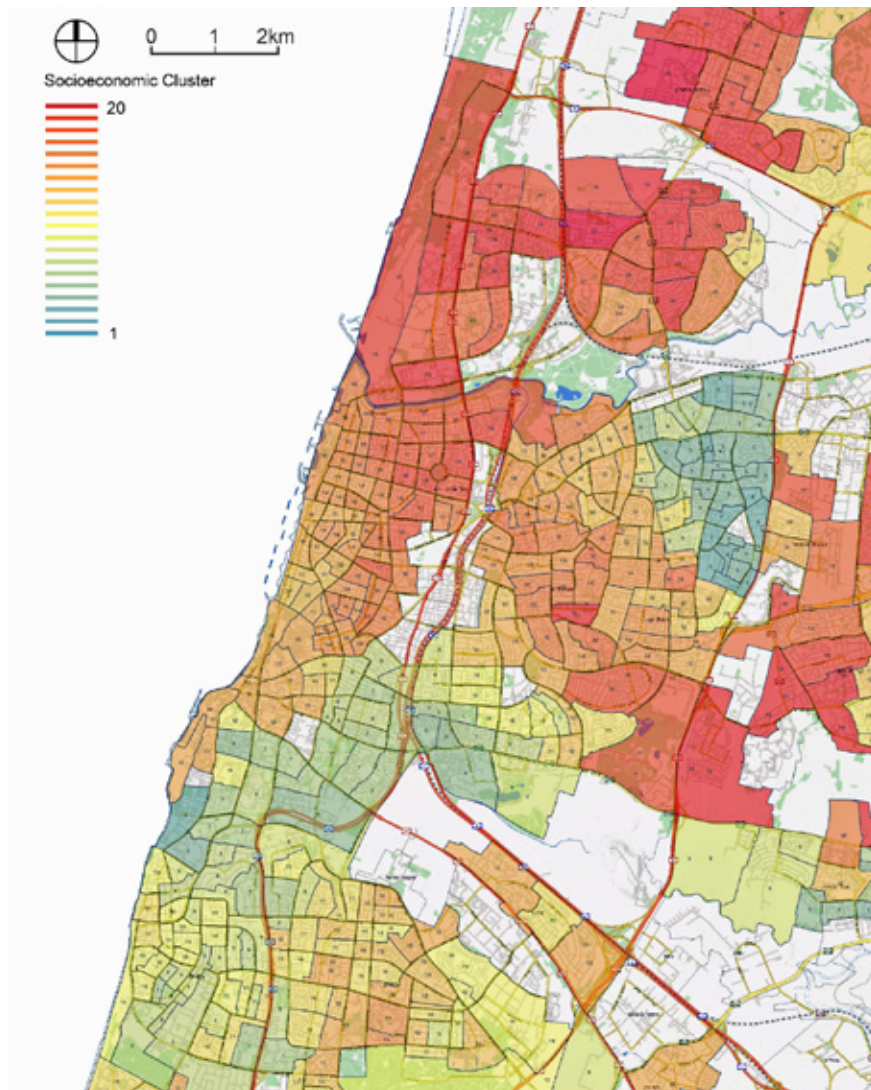


Figure 4 - Map of the Tel Aviv-Yafo metro area showing socioeconomic status distribution in 2008 (source: Survey of Israel and Israel Bureau of Statistics)

4. DATASETS AND METHODS

The effects of the historic “paper boundary” between Jaffa and Tel Aviv on the development of their urban area is analysed here with respect to the gradual urban development and growth of the cities. This diachronic type of analysis is expected to trace transforming and evolving urban centres, depending on the cities’ growth pattern (Can et al. 2015). We compared five historical stages in the development of Jaffa and Tel Aviv: Jaffa of the late 1870s, at the beginning of its expansion outside of the city walls; Jaffa at the beginning of the British Mandate, shortly before the delineation of the border with Tel Aviv; Jaffa and Tel Aviv of the late 1940s, just before the 1948 Arab-Israeli War; the united Tel Aviv-Yafo in 1965, including the towns to its east; and present day Tel Aviv-Yafo’s metro area. For each stage, we used the most reliable cartographic documents available: the 1879 map of Jaffa and its environs by Theodor Sandel (scales 1:9100 and 1:31800); a 1918 map of Jaffa by the British Survey of Egypt (scale 1:6000); a 1944 Survey of Palestine maps of Jaffa and Tel Aviv (scale 1:10000); a 1965 Survey of Israel map of Tel Aviv-Yafo, Ramat Gan, Givatayim, and Bnei Brak (scale 1:10000); and a present day OpenStreetMap of Tel Aviv-Yafo metro area.

The space syntax analysis types applied in this study for all five stages in the cities’ development are two: high metric radius normalised angular integration (NAIN) and low metric radius normalised angular choice (NACH). These two types of analysis highlight intricate differences at the neighbourhood and city level. Both manually drawn axial maps and road centre lines were used based on the availability of data. According to Turner (2007), there is only a small difference between using an axial map and a road-centre line map for Choice analysis when weighted according to segment length, and the same maps can also be used for calculating Integration values. The analysis was conducted with Depthmap X (Varoudis 2014). An additional axial map was created based on the 1944 maps, in which axial lines cut by the municipal border were divided into two separate lines, in a way that simulates the existence of a physical barrier between the cities, mimicking the assumed cognitive effect of the “paper boundary”. A comparison of the NAIN and NACH values of the “split” model with those of the “normal” 1944 model was expected to quantify the loss of Manshiya’s spatial potential due to the ethnic conflict between Arab and Jews.

Space syntax methodology works with two key concepts of centrality – Integration and Choice (also referred to as potential to-movement and potential through-movement). The NAIN analysis represents the to-movement potentials on various scales, in locations where urban centres tend to cluster around. Choice values may indicate the likelihood of certain urban areas to attract pedestrian or vehicular movement, assuming humans prefers to take the shortest and least convoluted route to a certain point. The NAIN and NACH measures correspond to the two basic elements of any trip: selecting a destination from an origin (NAIN), and choosing a route between origin and destination (NACH). Since the ethnic conflict negatively affected movement patterns between Jaffa and Tel Aviv, it is interesting to compare these two types of spatial analysis with our historical knowledge of the actual way in which urban life in the two cities unfolded.

5. RESULTS

The NAIN analyses of Jaffa and Tel Aviv (Figures 5-7, Table 1) correctly highlight the urban centres and main shopping streets of Jaffa and Tel Aviv during all stages of their development. They also reveal how the central core of the entire urban system gradually shifted from Jaffa’s historic core to north-east due to an asymmetrical urban growth. Already in 1918, Jaffa’s Old Town (the part that was until the early 1870s confined to the city walls) was losing its central position to the new commercial hub emerging around the Clock Square, along the road to Gaza (today’s Yefet Street), and from there extending north into Manshiya and south along King George Boulevard (today’s Yerushalayim Boulevard). The shifting of the system’s centre of gravity to north-east continued as the whole urban system expanded during the 1930s and 1940s. In 1944, Tel Aviv’s central locations (Magen David Square, the CBD’s core) already showed higher integration values than Jaffa’s central Clock Square, reflecting the fast expansion of Tel Aviv.

After 1948, when Tel Aviv grew to be the core of a metropolitan area, highest Integration values are found away from the old centres in Jaffa and Tel Aviv alike, along the eastern extension of the historic Nablus Road (today's Menahem Begin Road), including its north-eastern (Jabotinsky Road) and northern (Namir Road) branches. At the same time, Tel Aviv's historic central locations continued to show higher Integration values than Jaffa's central locations. The disintegrating effect of Manshiya's complete demolition made Integration values of Yefet Street and Manshiya's Al-Abbas Street (today's HaMered Street) substantially lower than in Tel Aviv's historical main streets.

The NACH analyses (Figures 8-10, Table 2) show a clear difference in the internal cohesion of Jaffa's urban fabric, when compared to that of Tel Aviv, since the 1940s and on. Jaffa's main streets showed substantially higher Choice values than the main streets of Tel Aviv, reflecting a concentration of Jaffa's commercial activities in a relatively small area. The expansion of Tel Aviv to the north during the 1930s and 1940s did not create a new urban centre for the city, and its historic downtown area preserved its status, showing the highest Choice values in the whole city (though not in the whole urban system).

Both the NAIN and NACH analyses underline the importance of Manshiya as a central hub of urban activity since the early 20th century until its demolition during the late 1960s and 1970s. Manshiya's main shopping street, Al-Abbas Street, showed substantially higher NACH values than all other main streets in Jaffa and Tel Aviv until the 1970s, while its NAIN values were also among the highest in both cities. With its northern extensions to the north (Al-Alim and HaKarmel Streets) and to the south (Yerushalayim Boulevard), it became a crucial linking artery that connected the urban centres of Jaffa (around the Clock Square) and Tel Aviv (around Magen David Square), as a backbone of the entire urban system until 1948. Ironically, the spatial potential of Manshiya as the strongest connector between Jaffa's historic core and central Tel Aviv was never fully realized because of the ethnic conflict between Arabs and Jews and the cognitive division of space according to the 1921 paper boundary. Since the late 1920s, Jaffa and Tel Aviv led separate urban life, with Manshiya quickly losing its urban significance.

The discrepancy between Manshiya's spatial potential and its actual urban status is well described by the simulated "split" model of the 1944 map. Compared to the unmanipulated 1944 map, the NAIN analysis of the "split" model shows Manshiya's northern "slum" area as a poorly integrated neighbourhood, with Integration values of Al-Alim and Al-Abbas Streets substantially lower than in the original 1944 map. Integration values of Tel Aviv's Magen David Square and its historic core were also substantially lower in the "split" model, implicating that the ethnic division between the cities negatively affected also the spatial Integration of Tel Aviv. NACH analyses of the same maps show almost no differences in Choice values between the main location and streets in both cities except in HaKarmel Street, whose Choice value is substantially lower in the "split" model in a way that underlines Manshiya's role as a vital enabler of through movement between the cities.

After 1948, Manshiya still provided an important spatial link between Jaffa and Tel Aviv, as both the NAIN and NACH analyses clearly show: Integration and Choice values of Al-Abbas and HaKarmel Streets were the highest among the main streets in both cities in the 1965 map. Yet because of the 1948 massive demolitions in the northern parts of Manshiya, and the deliberate neglect of its remaining buildings, this connective quality never led to the development of vibrant urban life concentrating around Manshiya's main street, contrary to what could have been expected from the spatial analyses.

The complete destruction of Manshiya until the early 1980s substantially weakened the spatial continuum from Jaffa's Old Town to Tel Aviv's downtown areas, thus creating a de-facto division between the two city centres. In current day Tel Aviv, the centrality of Magen David Square, as well as the central business district around the intersection of Rothschild Boulevard with Herzl Street and Allenby Street, are also well represented in their Integration and Choice values. The vicinity of Tel Aviv's historic core (its central business district) to Jaffa-Tel Aviv Road makes the latter a highly-integrated location in the entire urban system. Yet spatial analyses of the 2014 map also show that the two historic centres of Jaffa and Tel Aviv are now only loosely

connected; a comparison to the 1965 map is striking, since it reveals the now-gone spatial importance of Manshiya in stitching the centres of Jaffa and Tel Aviv into a powerful network of interconnections.



Figure 5 - Normalised angular integration (NAIN) analyses of Jaffa and Tel Aviv over time from 1879, 1918, 1944, and 1965, radius n. The 1944 map shows the municipal border between the cities

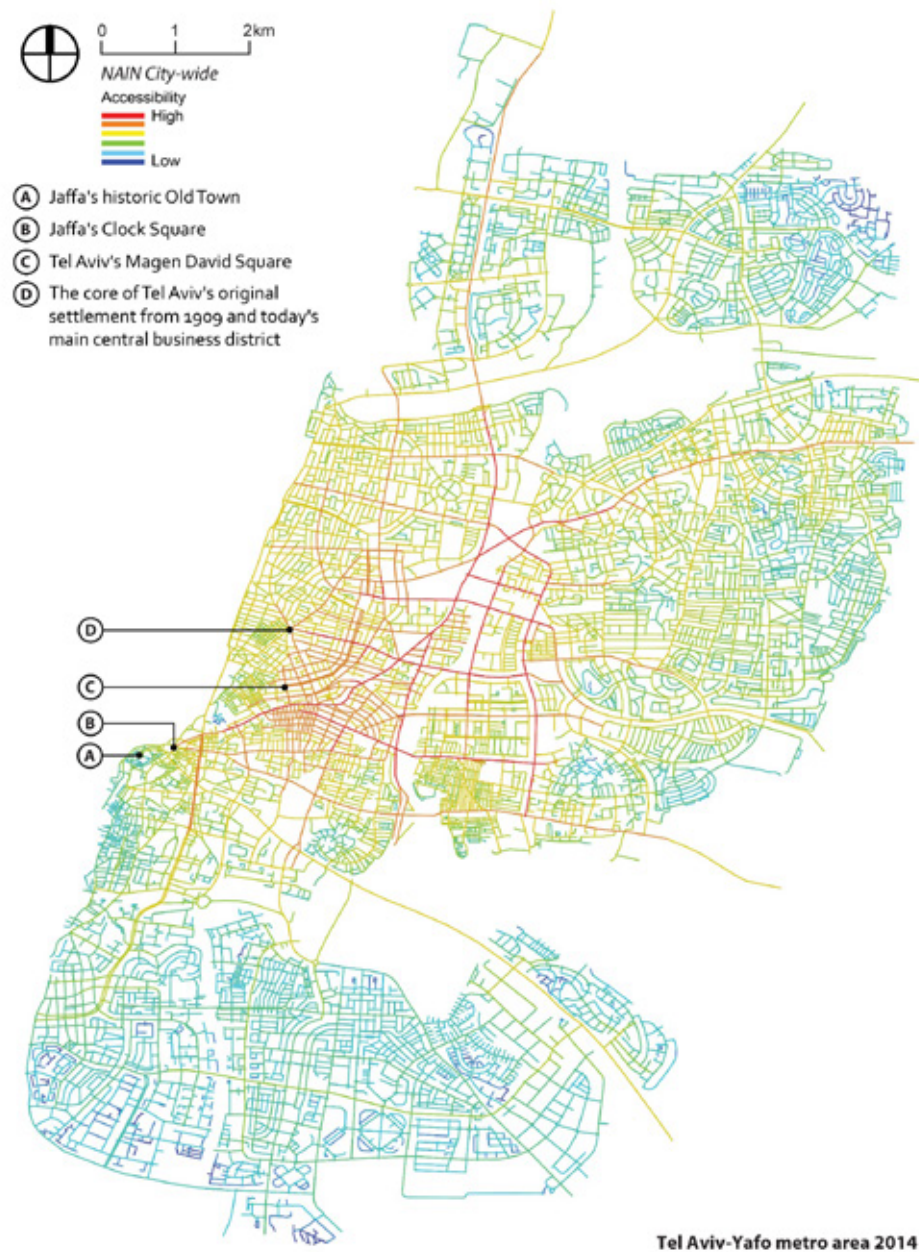


Figure 6 - Normalised angular integration (NAIN) analysis of Tel Aviv-Yafo metro area in 2014, radius n



Figure 7 - Normalised angular integration (NAIN), $r=n$, of the simulated "split" street network (left) that follows the border between Jaffa and Tel Aviv (1944 map). The unmanipulated 1944 map appears on the right

	Year	NAIN					
		1879	1918	1944	1944 Split	1965	2014
	System Min.	1.69	2.26	2.77	2.50	3.00	3.19
	System Avg.	1.93	2.58	3.05	2.82	3.38	3.49
	System Max.	2.11	2.77	3.22	3.03	3.59	3.69
A	Jaffa Old City	1.92	2.47	2.95	2.75	3.40	3.45
B	Clock Square	2.09	2.76	3.09	2.92	3.46	3.56
C	Magen David Square	-	-	3.18	2.99	3.53	3.61
D	CBD's core	-	2.62	3.16	2.91	3.50	3.62
1	Yefet Street	2.09	2.72	3.06	2.91	3.44	3.53
2	Yerushalayim Boulevard	-	2.72	3.18	3.00	3.51	3.62
3	Jaffa-Tel Aviv Road	2.04	2.72	3.21	2.91	3.54	3.65
4	Herzl Street	-	2.65	3.18	2.91	3.51	3.63
5	Allenby Street	-	2.56	3.20	3.02	3.53	3.62
6	Rothschild Boulevard	-	2.59	3.14	2.92	3.50	3.62
7	HaKarmel Street	-	2.59	3.14	2.91	3.54	3.57
8	Al-Alim Street	-	2.67	3.13	2.83	3.54	-
9	Al-Abbas Street	-	2.76	3.19	3.01	3.54	3.54

Table 1 - Value property table of Jaffa and Tel Aviv's urban central locations over time, NAIN analyses



Figure 8 - Normalised angular choice (NACH) analyses of Jaffa and Tel Aviv from 1879, 1918, 1944, and 1965, with a low metrical radius. The 1944 shows the municipal border between the cities



Figure 9 - Normalised angular choice (NACH) analysis of Tel Aviv-Yafo metro area from 2014, with a low metrical radius

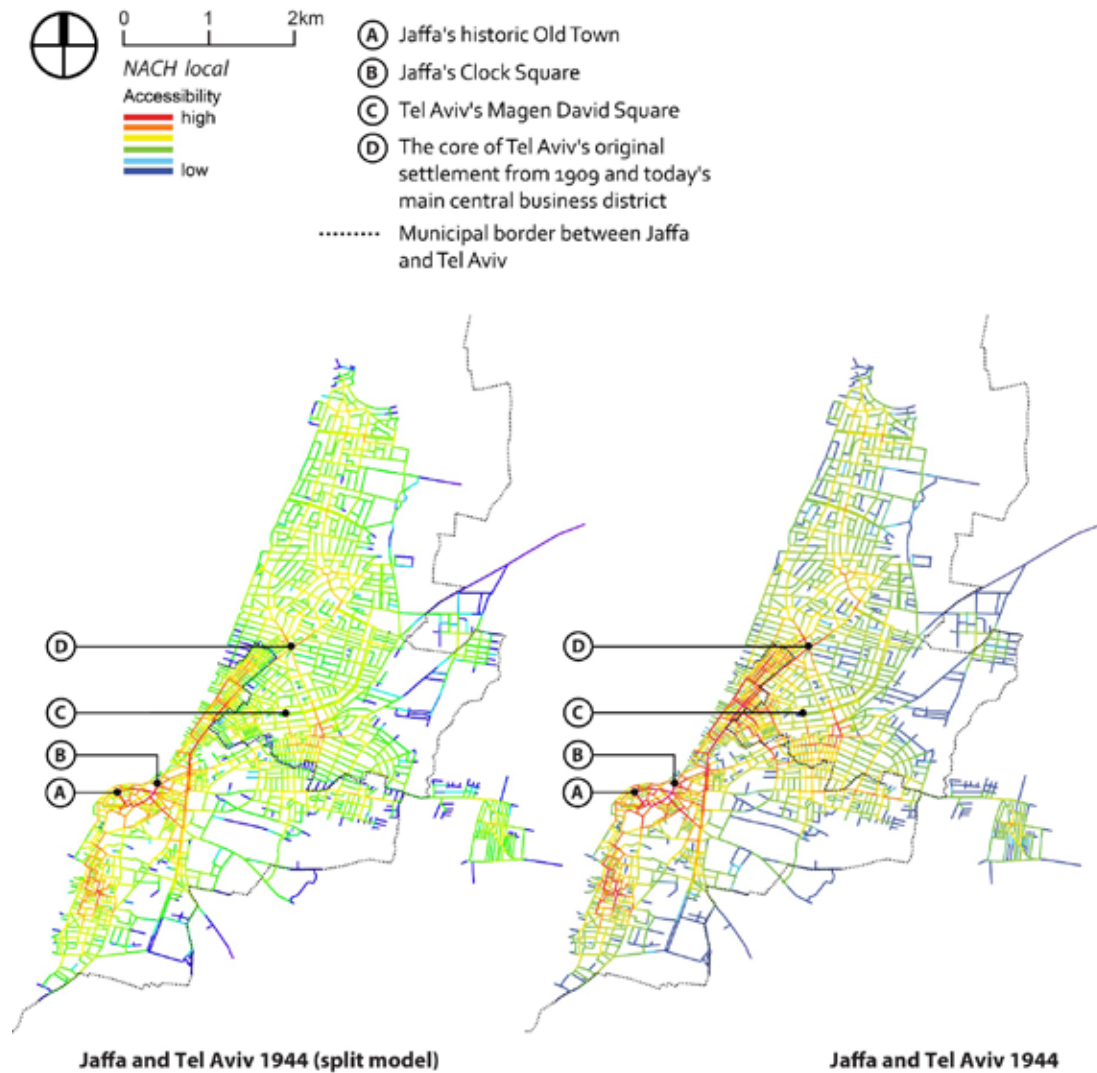


Figure 10 - Local normalised angular choice (NACH) of the simulated "split" street network (left) that follows the border between Jaffa and Tel Aviv (1944 map). The unmanipulated 1944 map appears on the right

	Year	NAIN					
		1879	1918	1944	1944 Split	1965	2014
	System Min.	0.48	0.60	0.70	0.70	0.70	0.70
	System Avg.	1.87	2.37	3.00	2.94	3.35	3.39
	System Max.	2.81	3.56	4.20	4.20	5.00	4.94
A	Jaffa Old City	2.18	2.80	3.39	3.40	3.76	3.76
B	Clock Square	2.05	2.80	4.10	4.12	4.59	4.64
C	Magen David Square	-	-	3.77	3.68	3.92	4.55
D	CBD's core	-	1.98	2.97	2.95	4.01	3.99
1	Yefet Street	1.76	2.34	3.80	3.76	4.48	4.46
2	Yerushalayim Boulevard	-	1.67	3.51	3.52	4.21	4.30
3	Jaffa-Tel Aviv Road	1.09	1.87	3.35	3.21	4.42	4.11
4	Herzl Street	-	2.11	3.38	3.22	4.22	4.42
5	Allenby Street	-	1.67	3.45	3.44	4.09	4.23
6	Rothschild Boulevard	-	1.68	3.03	3.02	3.64	3.89
7	HaKarmel Street	-	2.33	3.70	3.12	4.45	4.01
8	Al-Alim Street	-	3.14	3.69	3.91	4.32	-
9	Al-Abbas Street	-	2.99	4.08	4.06	4.86	4.27

Table 2 - Value property table of Jaffa and Tel Aviv's urban central locations over time, NACH analyses

6. CONCLUSION

Combining spatial analysis and historical research enables to explain how the ethnic and national conflict between Arabs and Jews in British Palestine affected not only the development of the urban fabric of Jaffa and Tel Aviv but also the way this fabric was used by the two communities. The "paper boundary" that was drawn between the two cities in 1921 transformed the life of their Arab and Jew populations in a way that undermined the physical unity and spatial potential of their common urban street network. This discrepancy between spatial potential and actual use of urban space is highly evident in the case of Manshiya: despite its central position within the entire urban system, it became a marginal and neglected area that deteriorated quickly, was widely regarded as a "slum", and eventually was razed to the ground. Ironically, the complete destruction of Manshiya materialized the earlier non-physical separation between the centres of Jaffa and Tel Aviv in a new, tangible reality, while contradicting the rationale behind the post-1948 unification of Jaffa and Tel Aviv into a single, Jewish-dominated, city.

The application of space syntax in studying the history of cities, as demonstrated here with the case of Jaffa and Tel Aviv, adds a valuable and quantifiable component to the historical understanding of urban processes. Space syntax can expose the "spatial potential" of a city (the predicted intensity of social interconnectedness and movement flows of people) and the location of potential urban centres. Its addition to conventional historical research can thus invigorate the way we understand growth and transformation patterns in cities. At the same time, it also exposes the tensions and interplays between physical and social forces that shape the life of cities, since these forces can control and affect the actual use of space in a way

that may undermine the spatial potential provided by the physical composition of the urban network. The historical case of Jaffa and Tel Aviv may indeed indicate that prolonging ethnic tensions may undermine the prediction of Hillier's law of natural movement (Hillier 2012) and break the seemingly direct link between street network configuration and movement flows.

Previous studies have shown that social forces or social composition of city populations can overrun spatial forces (Shu 2000, de Holanda and Tenorio 2012). In the case of Jaffa and Tel Aviv, the ethnic and national aspirations and tensions have shaped urban development and spatial use patterns in several ways. First, members of the Jewish community in Jaffa founded a spatially segregated neighbourhood in Jaffa that soon became the core of the city of Tel Aviv. By obtaining a municipal status in 1921 (as well as its clear spatial definition through its "paper boundaries"), Tel Aviv introduced a new type of cognitive distinctions in the urban fabric that were based on the identification of spatial domains as "Arab" or "Jewish". This cognitive division undermined the physical reality of the urban street network, created a new logic of segregated development in Tel Aviv and Jaffa alike, and led to the rapid decline of the centrally-located Manshiya neighbourhood. After the 1948 War, the former "Arab" reputation of Jaffa now undermined its full integration into Tel Aviv. As a result, central parts of Jaffa's historic core were neglected, demolished, and only sparsely rebuilt, as if Jaffa was still a hostile entity that needed subjugation. These policies led to a physical transformation of the historic core of the two cities, ultimately resulting in spatial separation that could be interpreted as a belated echo of older cognitive distinctions.

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